

**METHODS OF SAMPLING AND TESTING
MT 325-05
METHOD OF DETERMINING MOISTURE CONTENT
OF BITUMINOUS MIXTURES OR AGGREGATE
USING MICROWAVE OVENS**

Revised Edition – September 2005

Added 3.2 – paper plates

3.4 – Deleted size requirements for spatula.

3.5 – Deleted “asbestos gloves”

Deleted - 3.7, 3.8, 5.1.

5.3 – Changed time requirement from **10** minutes to **2** minutes.

5.4 – Changed time requirement from **5** minutes to **2** minutes.

Deleted – Note 1.

Deleted – 7.1, 7.5, 7.6, 7.7.

Page down for procedure.

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1 Scope:

- 1.1** This method provides a procedure for determining the amount of moisture in either bituminous mixtures or graded aggregates used in bituminous mixtures. Its primary purpose is to provide a rapid field test to permit production control of bituminous mixtures. Its use is limited to asphalt mixtures consisting of paving grades of asphalt.

2 Referenced Documents:

AASHTO:

M 231 Weighing Devices Used in the Testing of Materials

MT Materials Manual:

MT-201 Sampling Roadway Materials

MT-202 Sieve Analysis of Fine and Coarse Aggregate

MT-303 Sampling Bituminous Paving Mixtures

MT-309 Reducing Samples of Hot Mix Asphalt to Testing Size

MT-322 Quantitative Extraction of Bituminous Mixtures

MT-417 Reducing Field Samples to Testing Size

3 Apparatus:

- 3.1** *Microwave* - oven capable of holding 4000-gram sample.
- 3.2** *Sample containers* - capable of holding 600 grams (must be Pyrex, glass, porcelain, ceramic or paper plates).
- 3.3** *Balance* - with a 16,000-gram capacity and sensitive to 0.1 gram and conforming to the requirements of M 231.
- 3.4** *Spatula* -
- 3.5** *Gloves*.
- 3.6** *Airtight container* - capable of holding the 2500 to 3000 gram sample.
- 3.7** *Flat pan* - approximately 25 x 20 x 3 inches.

4 Sample Preparation:

- 4.1** Obtain 2500 to 3000 grams of bituminous mix (according to MT-303) or aggregate (according to MT-201).
- 4.2** Quarter the aggregate into two 500 ± 50 gram samples. Aggregate samples will be reduced in size according to MT-417.
- 4.3** Bituminous mixtures will be reduced in size according to MT-309, Method B, to two 500 ± 50 gram samples.

5 Procedure:

- 5.1 Place sample in tared container, and weigh to the nearest 0.1 gram.
- 5.2 Put sample in microwave oven and turn oven on.
- 5.3 After 2 minutes, turn the oven off, remove the container and sample, weigh the sample and container to the nearest 0.1-gram, and record the weight.
- 5.4 Place sample and container back in the oven. Turn oven on, and dry sample for 2 more minutes.
- 5.5 Remove sample and container from oven, weigh to the nearest 0.1-gram, and record weight.
- 5.6 Repeat steps 5.4 and 5.5 until a constant weight is obtained.

6 Calculations:

- 6.1 After a constant weight has been obtained, calculate the moisture content of the sample as follows:

$$\text{Percent of Initial Moisture} = \frac{M_i - M_f}{M_i} \times 100$$

Where - M = % Moisture

M_i = initial, moist mass

M_f = final, dry mass

Example - M_i = 541.2g

M_f = 536.0g

$$\text{Moisture Content} = \frac{541.2\text{g} - 536.0\text{g}}{541.2\text{g}} \times 100 = 0.961, \text{ say } 0.96\%$$

- 6.2 If the moisture contents of the two samples differ by more than 0.2%, the test is invalid. In this case new samples must be prepared and the test rerun.
- 6.3 Record the moisture content as the average of the two samples.

7 Precautions:

- 7.1 Use gloves for handling hot mixtures during quartering and when placing in or removing from oven.
- 7.2 Do not use metal containers in oven at any time. Damage to the oven will occur.
- 7.3 Do not delay getting sample into oven after sampling. (If a delay of 15 minutes or more is anticipated, samples must be placed into and kept in sealed containers. For reliable results, all samples should be tested within 1 hour of sampling).